KANSAS DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION TO THE
STANDARD SPECIFICATIONS, 2015 EDITION

Delete SECTION 1725 and replace with the following:

SECTION 1725

DETECTABLE WARNING SURFACE PANELS FOR CURB RAMPS AND MEDIANS

1725.1 DESCRIPTION

This specification governs fabrication of panels compliant with the Public Rights-of-Way Accessibility Guidelines (PROWAG). The panels are required to comply with all dimensional requirements as stipulated within the PROWAG.

1725.2 REQUIREMENTS

a. General.

(1) Any manufacturer producing panels under this specification must be currently prequalified. Procedures for prequalification are outlined in **subsection 1725.4**.

(2) Unless shown otherwise in the Contract Documents, manufacture all panels provided under this specification to comply with the applicable subsections.

(3) Provide in the appropriate color stipulated in the Contract Documents. Warrant the color for 5 years.

b. Prestressed Concrete Panels.

(1) Provide a non-rusting prestressed support system integrated into the lower portion of the panel. The system is required to impart a pressure in excess of 200 psi in both horizontal directions on a fully cured panel.

(2) Dimensions. Provide a 2 X 2 foot panels that comply with the dimensions and details specified by the PROWAG. Larger panels may be used if approved by the Engineer.

(3) Material Specifications. Provide panels that comply with **TABLE 1725-1**.

Table 1725-1: REQUIREMENTS FOR PRESTRESSED CONCRETE PANELS

Property	Test Method	Requirement
Accelerated Weathering	ASTM G 155	No visible change (2915 hrs)
Compressive Strength	ASTM C 39	≥ 8,000 psi
Slip Resistance	ASTM D 2047	≥ 0.80

c. Concrete Panels.

(1) Provide a precast concrete panel "wet-set" into the host concrete. Supplementary cementitious materials, epoxy resin type polymers, and/or non-metallic fibers may be used to reduce permeability, and increase strength, durability and toughness.

(2) Dimensions. Provide nominal 2 X 2 or 2.5 X 2-foot panels that comply with all dimensions and details specified by the PROWAG. Larger panels may be used if approved by the Engineer.

(3) Anchorage. Provide spike type nylon or HDPE anchors, or corrosion resistance metallic anchors whose shape minimizes concrete displacement yet promotes anchor/aggregate interlock within the host concrete. The minimum number of anchors per panel equals the nominal panel area (sq. ft.) divided by 1.5, but not less than four per panel. Alternately, non-abutting sides may utilize a smooth, sloping face which "locks" the panel into hardened concrete.

(4) Anchor to Panel Fasteners. Secure anchors to the bottom of the panel with self-tapping, coarse-threaded, stainless steel screws. The screws must be long enough to penetrate through the panel via cast holes and imbed a minimum of 1 inch into the anchor. Panels utilizing an anchor/fastener system whose components use fine-threaded, machine screws or bolts will not be accepted.

(5) Color. Panel color must be blended into the constituent material and homogenous throughout the panel. Panels using a coating to achieve color fastness, UV stability, or a weatherproof surface will not be approved.

(6) Materials Specifications. Except as specified above for prestressed concrete panels, provide concrete panels that comply with **TABLE 1725-2**.

Table 1725-2: REQUIREMENTS FOR CONCRETE PANELS

Property	Test Method	Requirement
Accelerated Weathering	ASTM G 155	No visible change ($\Delta E \leq 2$) after 2000 hrs
Compressive Strength	ASTM C39 or C170	8000 psi (min)
Flexural Strength	ASTM C 348	2000 psi (min)[1]
Flexural Strength	ASTM D 790	6000 psi (min yield), no break[2]
Slip Resistance	ASTM C 1028	0.80 (min) wet or dry
Abrasion Resistance	ASTM C 779, Procedure A	0.02-inch wear (max) after 60 minutes
Water Absorption	ASTM C 140 or C 97	5% (max)[1]
Water Absorption	ASTM D 570	1% (max)[2]
Freeze-Thaw	ASTM C 666	100% (no loss) after 660 cycles

Note 1: Requirement for all types except polymer concrete.
Note 2: Requirement for polymer concrete types.

d. Composite Panels.

(1) Provide an anchored cast-in-place design that is replaceable without removing or damaging the surrounding hardened concrete.

(2) Panel. Provide a homogeneous, monolithic, glass-reinforced composite panel that is colorfast and UV stable. Incorporate coloring pigments and chemicals to enhance UV stability uniformly throughout the product. Panels using a coating to achieve color fastness or UV stability will not be approved.

If provided, a reinforcing flange or wedge along the perimeter of the panel can be no more than 0.75-inch deep (total depth, including panel thickness) and must be shaped in such a fashion so that it does not prevent panel removal and replacement in hardened concrete. Provide breaks in the perimeter flange to allow for air evacuation from under the panel during installation.

Cast the manufacturer's name into the top surface of the panel.

(3) Dimensions. If possible, provide a single, standard size panel large enough to comply with the length and width requirements in the contract documents. If a single panel will not satisfy the dimensional requirements in the contract documents, arrange the fewest number of standard size panels to minimize total joint length and panel cutting.

Provide a panel whose dome size and in-line spacing is compliant with PROWAG.

(4) Anchor. Provide nylon or HDPE, or corrosion resistant anchors. Provide a self-threading anchor design that allows for repeated panel removal and re-installations.

Provide a spike type anchor providing a minimum of 1.5 inches of concrete embedment (measured from the adjoining panel's bottom face) and whose shape facilitates insertion into stiff, plastic concrete by minimizing concrete displacement while maximizing aggregate/anchor interlock. Other anchor shapes will be considered as part of the prequalification review on a case-by-case basis provided the panel manufacturer can provide a 3-year history of satisfactory anchor performance, especially in relation to anchor insertion under less than ideal concrete conditions and anchor pullout.

The outer "ring" of anchors can be centered no more than 3 inches from the nearest edge of the panel, measured perpendicular to the edge. The center-to-center spacing between adjacent anchors can be no more than 18 inches in any direction.

(5) Anchor Fastener. Provide minimum #14 size, tamper-proof, countersunk, flathead, stainless steel fasteners that sets flush with the dome or field surface and provides at least 1 inch of embedment into the anchor. As part of the prequalification review of alternate anchors as described in **subsection 1725.2d.(4)**, a shorter fastener embedment or a different size of fastener with a different head will be considered on a case-by-case basis. Anchor systems utilizing fine-threaded, machine screws or bolts will be not be accepted.

(6) Panel Modification. Provide a panel which, when cut, is engineered to conveniently facilitate the drilling of additional countersunk holes at thickened auxiliary anchor points to accommodate the maximum anchor spacing and edge

distance requirements of **subsection 1725.2d.(4)**. If this requirement cannot be met, the panel will be approved for uncut applications only.

(7) Surface Protection. Provide a removable plastic film to protect the panel surface during installation.

(8) Material Specifications. Provide a composite panel that complies with **TABLE 1725-3**.

Table 1725-3: REQUIREMENTS FOR COMPOSITE PANELS

Property	Test Method	Requirement
Water Absorption	ASTM D 570	≤ 0.50%
Accelerated Weathering	ASTM G 154 or G155	No visible change (2000 hrs)
Flexural Strength	ASTM D 790, Procedure A	≥ 15,000 psi
Slip Resistance	ASTM C 1028	≥ 0.80 wet or dry
Abrasion Resistance	ASTM C 501	$I_w > 130$
Salt Spray	ASTM B 117	No visible change (120 hrs)
Freeze/Thaw/Heat	ASTM C 1026	No chipping, cracking, or peeling

e. Polymer Panels.

(1) Provide an anchored cast-in-place or "wet-set" design that is replaceable without removing or damaging the surrounding hardened concrete.

(2) Panel. Provide a homogeneous, monolithic, polyolefin panel that is colorfast and UV stable. Incorporate coloring pigments and chemicals to enhance UV stability uniformly throughout the product. Panels using a coating to achieve color fastness or UV stability will not be approved.

A reinforcing flange or wedge along the perimeter of the panel is not required, but if present can be no more than 0.75 inches deep (total depth, including panel thickness) and must be shaped in such a fashion so that it does not prevent panel removal and replacement in hardened concrete. Provide breaks in the perimeter flange to allow for air evacuation from under the panel during installation.

Cast the manufacturer's name into the top surface of the panel.

(3) Dimensions. If possible, provide a single, standard size panel large enough to comply with the length and width requirements in the contract documents. If a single panel will not satisfy the dimensional requirements in the contract documents, arrange the fewest number of standard size panels to minimize total joint length.

Provide a panel whose dome size and in-line spacing is compliant with PROWAG.

(4) Anchor. Provide nylon or HDPE, or corrosion resistant anchors. Provide a self-threading anchor design that allows for repeated panel removal and re-installations.

Provide a spike type anchor providing a minimum of 1.5 inches of concrete embedment (measured from the adjoining panel's bottom face) and whose shape facilitates insertion into stiff, plastic concrete by minimizing concrete displacement while maximizing aggregate/anchor interlock. Other anchor shapes will be considered as part of the prequalification review on a case-by-case basis provided the panel manufacturer can provide a 3-year history of satisfactory anchor performance, especially in relation to anchor insertion under less than ideal concrete conditions and anchor pullout.

The outer "ring" of anchors can be centered no more than 3 inches from the nearest edge of the panel, measured perpendicular to the edge. The center-to-center spacing between adjacent anchors can be no more than 18 inches in any direction.

(5) Anchor to Panel Fasteners. Secure anchors to the bottom of the panel with minimum #14 size, self-tapping, coarse-threaded, tamper-proof, stainless steel screws. The screws must be long enough to penetrate through the panel via preformed holes and imbed a minimum of 1 inch into the anchor. Panels utilizing an anchor/fastener system whose components use fine-threaded, machine screws or bolts will not be accepted.

(6) Panel Modification. No drilling or cutting will be permitted.

(7) Curved Installations. All prequalified polymer systems must include the capability for curved (or radiused) installations without the need to cut panels. This shall be accomplished using standard square or rectangular panels and wedges of various sweep angles. Wedges shall be manufactured from the same material, come from the same manufacturer and have the same color as the standard panels. Using the preformed anchor holes and anchor fasteners, the wedges must be capable of providing a positive connection to adjacent standard panels.

(8) Surface Protection. Provide a removable plastic film to protect the panel surface during installation.

(9) Material Specifications. Provide a panel that complies with **TABLE 1725-4.**

Table 1725-4: REQUIREMENTS FOR POLYMER PANELS		
Property	**Test Method**	**Requirement**
Water Absorption	ASTM D 570	≤ 0.10%
Accelerated Weathering	ASTM G 154 or G155	No visible change (2000 hrs)
Flexural Strength	ASTM D 790, Procedure A	≥ 3500 psi
Slip Resistance	ASTM C 1028	≥ 1.20 wet or dry
Abrasion Resistance	ASTM C 501	$I_w > 120$
Salt Spray	ASTM B 117	No visible change (200 hrs)
Freeze/Thaw/Heat	ASTM C 1026	No chipping, cracking, or peeling

1725.3 TEST METHODS

Perform all test methods as specified in **subsection 1725.2** for the given product type.

1725.4 PREQUALIFICATION

a. General. Panels must be able to comply with the general and product specific requirements of **subsection 1725.2** to be prequalified. KDOT reserves the right to perform accelerated weathering testing on submitted samples.

b. All Panel Types. In addition to that specified in the following paragraphs, send product literature (including detailed and dimensioned drawings of all manufactured panel sizes), test reports from an accredited lab, MSDS, and installation and removal instructions. Each color requires accelerated weathering testing.

c. Concrete. Send a single 6 x 6-inch sample of each color to be prequalified to the Bureau Chief of Construction and Materials along with test results from a certified laboratory (CCRL, A2LA or NVLP). If the product uses attached anchors, also include a 6 x 6-inch sample (any color) with a central anchorage.

d. Composite. For each color to be prequalified, send a single uncut panel (w/installed anchors) of the smallest manufactured size to the Bureau Chief of Construction and Materials. Include either a single separate anchor/fastener or a fastener matching tamper-proof bit to facilitate removal of an installed anchor from a submitted panel .

e. Polymer. For each color to be prequalified, send a single uncut square or rectangular panel (w/installed anchors) of the smallest manufactured size and a single wedge of any sweep angle to the Bureau Chief of Construction and Materials. Include either a single separate anchor/fastener or a fastener matching tamper-proof bit to facilitate the removal of an installed anchor from a submitted panel.

f. Re-Prequalification. Material or physical changes to panels or anchors requires re-prequalification. Changes in panel size or additions to the number of standard panel sizes does not require re-prequalification as long as the spacing and edge distance requirements of **subsection 1725.2d.(4)** continue to be satisfied.

g. Maintaining Prequalification. The Bureau of Construction and Materials will maintain a prequalified list of all complying products. Products will remain on the prequalified list as long as performance in the field is satisfactory.

1725.5 BASIS OF ACCEPTANCE

The manufacturer must be currently prequalified as specified in **subsection 1725.4**.
Receipt and approval of a Type C certification as specified in **DIVISION 2600**.
Visual inspection for cracked or damaged panels.